WHAT IS CLAIMED IS:

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1. A digital television receiver system comprising:

an equalizer having an input for receiving a transmitted digital data stream comprising a plurality of field syncs, a plurality of segments of symbol spaces between successive ones of the field syncs, and a plurality of echo cancellation reference signals between the field snycs, the equalizer operatively processing the digital data stream at the input thereof with the echo cancellation reference signals to provide a substantially echo-free digital data stream at an output thereof; and

a digital television receiver having an input coupled to the output of the equalizer.

2. The digital television receiver system as in claim 1, wherein the digital data stream at the output of the equalizer includes the echo cancellation reference signals, further comprising a temporary memory coupled to the output of the equalizer for removal of the echo cancellation reference signals from the digital data stream, the digital television receiver being coupled to the output of the equalizer through the temporary memory.

3. The digital television receiver system as in claim 2, wherein the transmitted digital data stream is an ATSC VSB digital data stream into which the echo cancellation reference signals are inserted prior to transmission thereof, and the digital television receiver is a standard VSB television receiver.

4. The digital television receiver system as in claim 1, wherein:

at least some of the symbol spaces in the transmitted digital data stream are blank and are functionally related to the echo cancellation reference signals to form macro echo cancellation reference assembly signals; and

the digital data stream at the output of the equalizer includes the macro echo cancellation reference assembly signals;

the digital television receiver system further comprising a temporary memory coupled to the output of the equalizer for removal of the macro echo cancellation reference assembly signals from the digital data stream, the digital television receiver being coupled to the output of the equalizer through the temporary memory.

5. The digital television receiver system as in claim 2, wherein the transmitted digital data stream is an ATSC VSB digital data stream into which the macro echo cancellation reference assembly signals are inserted prior to transmission thereof, and the digital television receiver is a standard VSB television.

6. The digital television receiver system as in claim 1, wherein:

the transmitted digital data stream is an ATSC VSB digital data stream into which the echo cancellation reference signals are inserted prior to transmission thereof;

the digital data stream at the input of the receiver includes the echo cancellation reference signals; and

the digital television receiver is a VSB television receiver.

7. The digital television receiver system as in claim 6, wherein the VSB television receiver is a modified standard VSB television receiver comprising:

means for identifying and skipping the echo cancellation reference signals in the digital data stream at the input of the modified standard VSB television receiver;

means for handling any break up during transmission of convolution codes in the transmitted digital data stream so that sequential switching sites in the modified standard VSB television receiver operate properly;

means for picking up unlinked data in the transmitted digital data stream and linking the unlinked data to prior states thereof; and

a modified data interleaver for maintaining order when the convolution codes are discontinuous.

8. The digital television receiver system as in claim 1, wherein:

at least some of the symbol spaces in the transmitted digital data stream are blank and are functionally related to the echo cancellation reference signals to form macro echo cancellation reference assembly signals;

the digital data stream at the input of the receiver includes the macro echo cancellation reference assembly signals;

the transmitted digital data stream is an ATSC VSB digital data stream into which the macro echo cancellation reference assembly signals are inserted prior to transmission thereof; and

the receiver is a VSB television receiver.

9. The digital television receiver system as in claim 8, wherein the VSB television receiver is a modified standard VSB television receiver comprising:

means for identifying and skipping the macro echo cancellation reference assembly signals in the digital data stream at the input of the modified standard VSB television receiver;

means for handling any break up during transmission of convolution codes in the transmitted digital data stream so that sequential switching sites in the modified standard VSB television receiver operate properly;

means for picking up unlinked data in the transmitted digital data stream and linking the unlinked data to prior states thereof; and

a modified data interleaver for maintaining order when the convolution codes are discontinuous.

10. A digital television receiver system as in claim 1, wherein the equalizer comprises:

an extraction circuit for extracting copies of the echo cancellation reference signals from the digital data stream at the input of the equalizer;

a microprocessor coupled to the extraction circuit for calculating filter coefficients from the extracted copies of the echo cancellation reference signals; and

a filter receiving the digital data stream from the input of the equalizer coupled to the microprocessor for substantially canceling echo interference from the transmitted digital data stream.

11. The digital television receiver system as in claim 10, wherein the filter comprises a FIR filter section and an IIR filter section.

12. The digital television receiver system as in claim 1, wherein:

the transmitted digital data stream is transmitted over a transmission path; and

the echo cancellation reference signal is non-cyclic, has a substantially flat frequency response within the bandwidth of said transmission path, has a large plurality of amplitude peaks over a time interval, and has proportionally shorter tails relative to the large plurality of amplitude peaks.

13. The digital television receiver system as in claim 1, wherein the echo cancellation reference signal is of a class of signals substantially defined by

$$f(t) = \frac{1}{2\pi} \int_0^{\Omega} [\, A \cos (b\omega^2) + jA \sin (b\omega^2) \,] \, e^{j\omega t} d\omega$$

$$+ \frac{1}{2\pi} \int_{-\Omega}^{0} [\, A \cos (-b\omega^2) + jA \sin (-b\omega^2) \,] \, e^{j\omega t} d\omega$$

A, b and Ω being real numbers.

14. The digital television receiver system as in claim 1, wherein successive ones of the field snycs contain therebetween only one echo cancellation reference signal.

15. The digital television receiver system as in claim 1, wherein successive ones of the field snycs contain therebetween a plurality of echo cancellation reference signals.

16. A method of processing a digital data stream having echo interference from transmission over a transmission path, the digital data stream having a plurality of field syncs and a plurality of segments of symbol spaces between successive ones of the field syncs, the method comprising:

identifying a plurality of echo cancellation reference signals between the field snycs;

processing the digital data stream with the echo cancellation reference signals to provide a substantially echo-free digital data stream; and

furnishing the substantially echo-free digital data stream to a digital television receiver;

wherein the echo cancellation reference signals are of a class of signals substantially defined by

$$f(t) = \frac{1}{2\pi} \int_0^{\Omega} [\, A \cos (b\omega^2) + jA \sin (b\omega^2) \,] \, e^{j\omega t} d\omega$$

$$+ \frac{1}{2\pi} \int_{-\Omega}^{0} [\, A \cos (-b\omega^2) + jA \sin (-b\omega^2) \,] \, e^{j\omega t} d\omega$$

A, b and Ω being real numbers.

17. The method as in claim 16, further comprising removing the echo cancellation reference signals from the substantially echo-free digital data stream subsequent to the processing step and prior to the furnishing step.

18. The method as in claim 16, wherein the identifying step further comprises identifying the echo cancellation reference assembly signals within a plurality of macro echo cancellation reference assembly signals.

19. A system for cancellation of echo interference in a transmitted data stream, comprising:

means for inserting a plurality of echo cancellation signals into an ATSC VSB digital data stream prior to transmission to generate a transmission digital data stream, the ATSC VSB data stream comprising a plurality of field syncs and a plurality of segments of symbol spaces between successive ones of the field syncs, and the echo cancellation reference signals being inserted between the field snycs and being of a class of signals substantially defined by

$$f(t) = \frac{1}{2\pi} \int_0^{\Omega} [\, A \cos (b\omega^2) + jA \sin (b\omega^2) \,] \, e^{j\omega t} d\omega$$

$$+ \frac{1}{2\pi} \int_{-\Omega}^{0} [\, A \cos (-b\omega^2) + jA \sin (-b\omega^2) \,] \, e^{j\omega t} d\omega$$

wherein A, b and Ω are real numbers;

means for transmitting the transmission digital data stream;

an equalizer having an input for receiving the transmission digital data stream, the equalizer operatively processing the transmission digital data stream at the input thereof with the echo cancellation reference signals to provide a substantially echo-free digital data stream at an output thereof; and

a VSB digital television receiver having an input coupled to the output of the equalizer.

20. A method for cancellation of echo interference in a transmitted data stream, comprising:

inserting a plurality of echo cancellation signals into an ATSC VSB digital data stream prior to transmission to generate a transmission digital data stream, the ATSC VSB data stream

comprising a plurality of field syncs and a plurality of segments of symbol spaces between successive ones of the field syncs, and the echo cancellation reference signals being inserted between the field snycs and being of a class of signals substantially defined by

$$f(t) = \frac{1}{2\pi} \int_0^{\Omega} [\, A\cos(b\omega^2) + jA\sin(b\omega^2)\,]\, e^{j\omega t} d\omega$$

$$+ \frac{1}{2\pi} \int_{-\Omega}^{0} [\, A\cos(-b\omega^2) + jA\sin(-b\omega^2)\,]\, e^{j\omega t} d\omega$$

wherein A, b and Ω are real numbers;

transmitting the transmission digital data stream;

subsequent to the transmitting step, processing the transmission digital data stream with the echo cancellation reference signals therein to provide a substantially echo-free digital data stream; and

applying the substantially echo-free digital data stream to a VSB digital television receiver.

21. An ATSC 8 VSB digital television receiver system comprising:

an equalizer having an input for receiving a transmitted digital data stream comprising a plurality of field syncs, a plurality of segments of symbol spaces between successive ones of the field syncs, and a plurality of macro echo cancellation reference assembly signals between successive ones of the field snycs, each of the macro echo cancellation reference assembly comprising a plurality of blank symbol spaces and at least one echo cancellation reference signal, the equalizer operatively processing the digital data stream at the input thereof with the echo cancellation reference signals to provide a substantially echo-free digital data stream at an output thereof;

a FIFO register to operatively remove the echo cancellation reference signals from the digital data stream at the output of the equalizer; and

a standard 8 VSB digital television receiver having an input coupled to the output of the FIFO register;

wherein the echo cancellation reference signals are of a class of signals substantially defined by

$$f(t) = \frac{1}{2\pi} \int_{0}^{\Omega} [\, A \cos (b\omega^2) + jA \sin (b\omega^2)\,] \, e^{j\omega t} d\omega$$

$$+ \frac{1}{2\pi} \int_{-\Omega}^{0} [\, A \cos (-b\omega^2) + jA \sin (-b\omega^2)\,] \, e^{j\omega t} d\omega$$

A, b and Ω being real numbers.